



1074157

CDM Standard Operating Procedure

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

SOP No.: CDM-LIBBY-06, Revision 0


SOP Title: Semi-Quantitative Visual Estimation of Vermiculite in Soils at
Residential and Commercial Properties

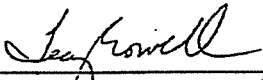
Project: Libby Asbestos Project – Pre-Design Inspections

Project No.: 2616

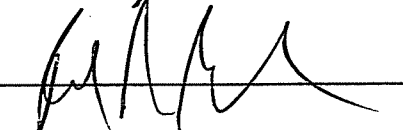
Client: U.S. Department of Transportation (DOT)/Volpe Center

Project Manager:  Date: 9/12/06

Technical Reviewer:  Date: 10/12/06

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Volpe Approval:  Date: 10/12/06

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Purpose:

For properties at which a pre-design inspection (PDI) is complete or currently in the PDI phase of remedial design and which are targeted for removal action clean-up during the 2007 construction season, EPA will further characterize these properties to identify and delineate the extent of any visible vermiculite (VV) present in surficial soils. The focus will be on parcels of soil at each property that were not found to have Libby amphibole asbestos (LA) contamination (non-detect concentrations (ND) by polarized light microscopy (PLM) (SRC-Libby-03, Rev 1) during previous investigations.

The goal of this standard operating procedure (SOP) is to provide a standardized approach to identify and characterize any VV present in surface soils in locations of interest. This semi-quantitative approach for visually estimating VV in soil will be initially piloted at several properties and then optimized accordingly as

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

the sampling teams gain experience. This will be accomplished by expanding and/or improving this SOP, supporting pictorial standards, and additional electronic data acquisition efforts, as necessary.

Definitions:

Specific Use Area (SUA) – Discrete exterior parcels on a property with a designated specific use. Due to the nature of activities typically carried out in SUAs, residents may be especially vulnerable to exposures when LA-contaminated soil becomes airborne. SUAs may be bare or covered with varying amounts of vegetation. SUAs previously identified at the Libby Site include:

- | | | |
|-----------------------|-----------------|-----------|
| ▪ Flower Pot | ▪ Garden | ▪ Dog Pen |
| ▪ Flowerbed | ▪ Former Garden | |
| ▪ Former
Flowerbed | ▪ Stockpile | |
| | ▪ Play Area | |

Common Use Areas (CUA) – Exterior parcels on a property with varied or generic use. CUAs may be bare or covered with varying amounts of vegetation. CUAs previously identified at the Libby Site include:

- | | | |
|---------------|-----------|-------------------------------------|
| ▪ Driveway | ▪ Road | ▪ Yard (front,
back, side, etc.) |
| ▪ Parking Lot | ▪ Walkway | |

Limited Use Area (LUA) – Exterior parcels on a property that are accessed, utilized, and maintained on a very limited basis. LUAs may be bare or covered with varying amounts of vegetation. Limited Use Areas include:

- | | |
|---------------------------|---|
| ▪ Pasture/Field | ▪ Overgrown Areas (with
trails/footpaths, or between
SUAs/CUAs) |
| ▪ Maintained/Mowed Fields | |

Non-Use Area (NUA) – Exterior parcels on a property with no current use (e.g., areas that are un-maintained and not accessed). NUAs may be bare or covered with varying amounts of vegetation. Non-Use Areas include:

- | | |
|--------------|------------------------|
| ▪ Wooded Lot | ▪ Un-maintained Fields |
|--------------|------------------------|

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

Since NUAs are not accessed and are not, therefore sources for exposure, semi-quantitative visual estimates of vermiculite in soil will not be captured.

SUA Zones – Parcels within SUAs no greater than 1,000 square feet (ft²).

Examples of SUA zones include but are not limited to garden, play area, flower bed, etc. Generally each SUA will be a single SUA zone. However, in cases of large gardens, flower beds, play areas, etc. that are larger than 1,000 ft², that parcel will be segregated into more than one SUA zone.

CUA Zones – Parcels within CUAs no greater than 2,500 ft². Examples of CUA zones include, but are not limited to, front yard, side yard, back yard, driveway, and parcels between sidewalk and road. If a front yard, for example, is larger than 2,500 ft², that parcel will be segregated into more than one CUA zone.

LUA Zones – Parcels within LUAs no greater than 2,500 ft². If a LUA is larger than 2,500 ft², that parcel will be segregated into more than one LUA zone.

Interior Surface (IS) Zones – Soil surfaces of interior buildings such as garages, pump houses, sheds, and crawlspaces. These parcels were not part of the original PDI characterization for visual identification of visible vermiculite.

Surface Inspection (SI) – Used in SUA, CUA, LUA, and IS zones. A SI is a non-intrusive visual inspection of the immediate surface of an entire zone. A SI consists of a brief walkthrough and visual inspection of an entire zone to determine if VV is present on the soil surface. If VV is observed during the SI, the location and a semi-quantitative estimate of VV contamination will be recorded.

Point Inspection (PI) – Used in SUA, CUA, LUA, and IS zones. A PI is an intrusive visual inspection of the top portions of the soil at a randomly selected point within a zone. A PI consists of the active displacement of the surface soil with a small shovel and visual inspection of the displaced soil to determine if visible vermiculite (VV) is present. If VV is observed during the PI, the location and a semi-quantitative estimate of VV contamination will be recorded.

Applicability:

This SOP applies only to properties that have already undergone a full PDI or properties that are currently at the PDI stage of the design process and are targeted for removal action clean-up during the 2007 construction season. The

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

following locations on a prospective clean-up property will be evaluated for the presence/absence of VV:

- All parcels on a property where soil was non-detect for LA under the original PDI.
- Soil surfaces of interior buildings such as garages, pump houses, sheds, and crawlspaces where VV was previously identified and soil samples were nondetect for LA.

Use of this SOP is inappropriate for any other application. Likewise, while the information gained during this effort will aid in identification of prospective properties that can be used during future activity-based sampling (ABS) efforts, the sampling design presented here does not provide sufficient information necessary for selecting a property or portion of a property for ABS studies.

Procedure:

Figure 1 illustrates the procedures and decision rules for this SOP. The four primary procedural steps are listed below:

- Establish zones
- Perform Surface Inspection
- Perform Point Inspection (if applicable)
- Perform Semi-quantification of visual vermiculite

Each is described in the following subsections.

Establish Zones:

Upon arrival at the property, the PDI field team shall locate all parcels that were non-detect for LA. The team shall measure the parcel sizes and note them on the EIC sketch and/or design drawings and begin zone identification. Parcels will be identified as SUA zones, CUA zones, LUA zones, or IS zones.

Zones shall be assigned in accordance with the definitions provided above. It is anticipated that SUAs and IS zones will generally tend to be smaller parcels and therefore, tend to fall into the less than 1,000 ft² (SUA zone/IS zone) category. Where necessary, larger SUAs or ISs shall be subdivided into more than one SUA/IS zone. No SUA/IS will be combined with any other SUA/IS. CUA and LUAs are expected to be larger parcels but may not exceed 2,500 ft², and

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

therefore, the parcel may require further subdivision into more than one zone. No area type may be combined with any other area type. In addition, zones may be further subdivided depending on site conditions (i.e., access, construction setup considerations, etc.)

Surface Inspection

As defined above, an SI is performed for the entire soil surface of a zone as vegetative cover (e.g., grass, landscaping, etc.) allows. Thick vegetative cover that limits or prevents inspection of the soil surface will be noted on the EIC before proceeding to the PI.

All zones identified shall be the boundaries used for SI evaluations. For any VV identified during each SI, the locations and semi-quantitative visual estimates of the vermiculite contamination for each SI will be recorded on the EIC sketch. Guidelines for semi-quantitative estimation of VV are described in the section below.

If during the SI, VV is observed to occur in a widespread manner throughout the zone, the entire zone will be denoted as containing VV on the EIC sketch and no further inspection will be required. Visible vermiculite extending spatially across approximately 50 percent (%) or more of a zone will be considered widespread. Figure 2 illustrates examples of widespread and localized vermiculite distribution.

If during the SI, VV is observed over a portion less than 50% of the zone spatially, the localized portion with VV will be denoted on the EIC sketch. Further delineation of the boundaries containing localized VV will be completed during the PI.

Point Inspections:

Following the SI, each zone will be assigned a set of PI locations. Professional judgment may be used to determine the exact location of PIs; however, the following guidelines will be implemented to maintain consistency.

A minimum of 5 PIs will be evaluated within each zone. Zones larger than 500 ft² will require evaluation at a minimum of 1 PI per 100 ft² (10 ft x 10 ft area). The PI locations will be randomly selected and will be spatially representative of the entire zone. Locations of the PIs and semi-quantitative estimates of VV (i.e., low, moderate, high, or gross) will be recorded on the EIC sketch for each PI. While a minimum of 5 PIs will be conducted per zone, there is no set maximum. Rather,

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

the maximum number of PIs is variable – dependent upon the total area of the zone and achieving the minimum required frequency of 1 PI per 100 ft².

The following sections outline procedures for inspecting each use area (e.g., SUA, CUA, LUA, IS). The procedure for semi-quantification of VV is provided in the next section.

SUA Zone:

- Visually inspect the PI point using a spade or trowel to remove any cover material, including excess debris (e.g., mulch, rock, etc.) and organic material, from the surface of the soil. Remove and visually inspect soil to a depth of 6 inches below ground surface¹.
- Record semi-quantitative estimate of VV observed as described in the following section.
- Replace soil and cover material.
- Repeat as necessary employing procedure outlined above.

CUA and LUA Zones:

- Visually inspect the PI point using a spade or trowel, carefully remove organic material, including grass/sod from the surface of the soil. Remove and visually inspect soil to a depth of 0 - 3 inches below ground surface².
- Record semi-quantitative estimate of VV observed as described in the following section.
- Carefully replace all soil and organic material.
- Repeat as necessary employing procedure outlined above.

IS Zone:

- Move items as necessary to access the soil surface.
- Visually inspect the PI points using a spade or trowel, remove and visually inspect soil to a depth of 0 - 3 inches below ground surface³.

¹ A soil depth of 6 inches for SUAs was chosen to approximate the depths to which digging would be expected during typical activities occurring in these SUA zones (e.g., gardening, dog digging in pen, etc.)

² A soil depth of 0-3 inches was chosen to approximate the depths to which soil disturbance would be most likely during typical activities occurring in these CUA and LUA zones (e.g., lawn mowing, driving over driveway, etc.)

³ A soil depth of 0-3 inches was chosen to approximate the depths to which soil disturbance would be most likely during typical activities occurring in these IS zones (e.g., entering crawlspace, retrieving items from shed, etc.)

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

- Record semi-quantitative estimate of VV observed as described in the following section.
- Repeat as necessary employing procedure outlined above.

If during the PI, VV is observed to occur in a widespread manner throughout the zone, the entire zone will be denoted on the EIC sketch and no further inspection will be required for that zone. Visible vermiculite covering approximately 50% or more of a zone spatially will be considered widespread. Figure 2 illustrates examples of widespread and localized vermiculite distribution.

If during the PI, VV is observed to be distributed over a portion less than 50% of the zone spatially, the localized portion with vermiculite will be denoted on the EIC sketch. If additional PIs are necessary to determine the boundaries of areas requiring removal, approximately 10 to 20% additional PIs will be evaluated to determine the extent of localized vermiculite.

Semi-Quantification of Visual Vermiculite:

During SI and PI, the pre-design field team will estimate the quantity of vermiculite observed during the SI and PI. Each SI and PI location for all zones will be assigned a semi-quantitative estimate of visible vermiculite content using a 5-point scale: none (blank), low (L), moderate (M), high (H), and gross (G). SI and PI locations where VV is observed, semi-quantitative estimates (e.g., L, M, H, or G) will be recorded on the EIC field sketch. SI and PI locations where VV is not observed will not be recorded on the EIC field sketch. Photographs illustrating these quantities are attached to this SOP as Figure 3. Additionally, jars of vermiculite-containing soils representing these 4 levels will be available for training and reference.

Under the current version of this SOP, there will be no effort to design an approach to combine vermiculite levels for SIs or PIs within or among zones. While the viability of combining semi-quantitative visual estimates within or among zones may be assessed as a pilot-scale evaluation, any SI or PI with visible vermiculite qualifies as vermiculite-containing soil for the area represented by the inspection point or inspection zone.

Health & Safety/Engineering Controls:

All personnel shall carry out visual inspections in accord with proper personal protective equipment (PPE) and other monitoring/governing requirements outlined in the most recent version of the Site Health and Safety Plan.

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

All visual inspections shall employ appropriate engineering controls to minimize dust (e.g., wetting soil during inspection) as prescribed in the Site-Specific Standard Operating Procedure for Soil Sample Collection (CDM-LIBBY-05, Revision 1).

Equipment Decontamination:

Equipment decontamination is not required between each PI from the same zone, but is required before moving to another inspection zone. CDM SOP 4-5 with site-specific modification will be used.

Documentation:

As noted above, information about the presence of vermiculite shall be recorded on the EIC field sketch and design drawing for the property under investigation. Each zone will be marked with:

- Zone type (e.g., SUA, CUA, LUA, NUA, or IS)
- Zone area in ft²
- SI or PI locations/ points
- Semi-quantitative estimate of VV content for each SI and/or PI

In addition to field sketch/design drawing documentation, each field team will generate a Supplemental Exterior Inspection Checklist (SEIC) (Figure 4) to document the semi-quantitative visual estimates of VV for each SI and PI for possible future information use.

Training:

Every effort will be made to ensure consistency in the semi-quantitative evaluation of VV in soil to the extent possible. This will include training (e.g., field calibration), specimen examples (i.e., jars/photographs of none, low, moderate, high, and gross quantities of vermiculite, etc.), designated field staff, and oversight by the pre-design field team leader. Figures illustrating none, low, moderate, high, and gross quantities of vermiculite are attached to this SOP for reference (Figure 2).

To ensure consistency over time, the pre-design field team leader will verify semi-quantitative assignments at a rate of one property per team per week. The team leader will sign off on those EIC sketches that were verified. If inconsistencies are noted, the pre-design field team leader will hold re-training

Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil

with all teams participating simultaneously. Updates to the SOP and its attached specimen examples will occur as necessary and CDM will notify EPA's Project Team Leader and Technical Assistance Unit when these updates are recommended by the pre-design field team or team leader.

Figure 1 – Visible Vermiculite Inspection Process

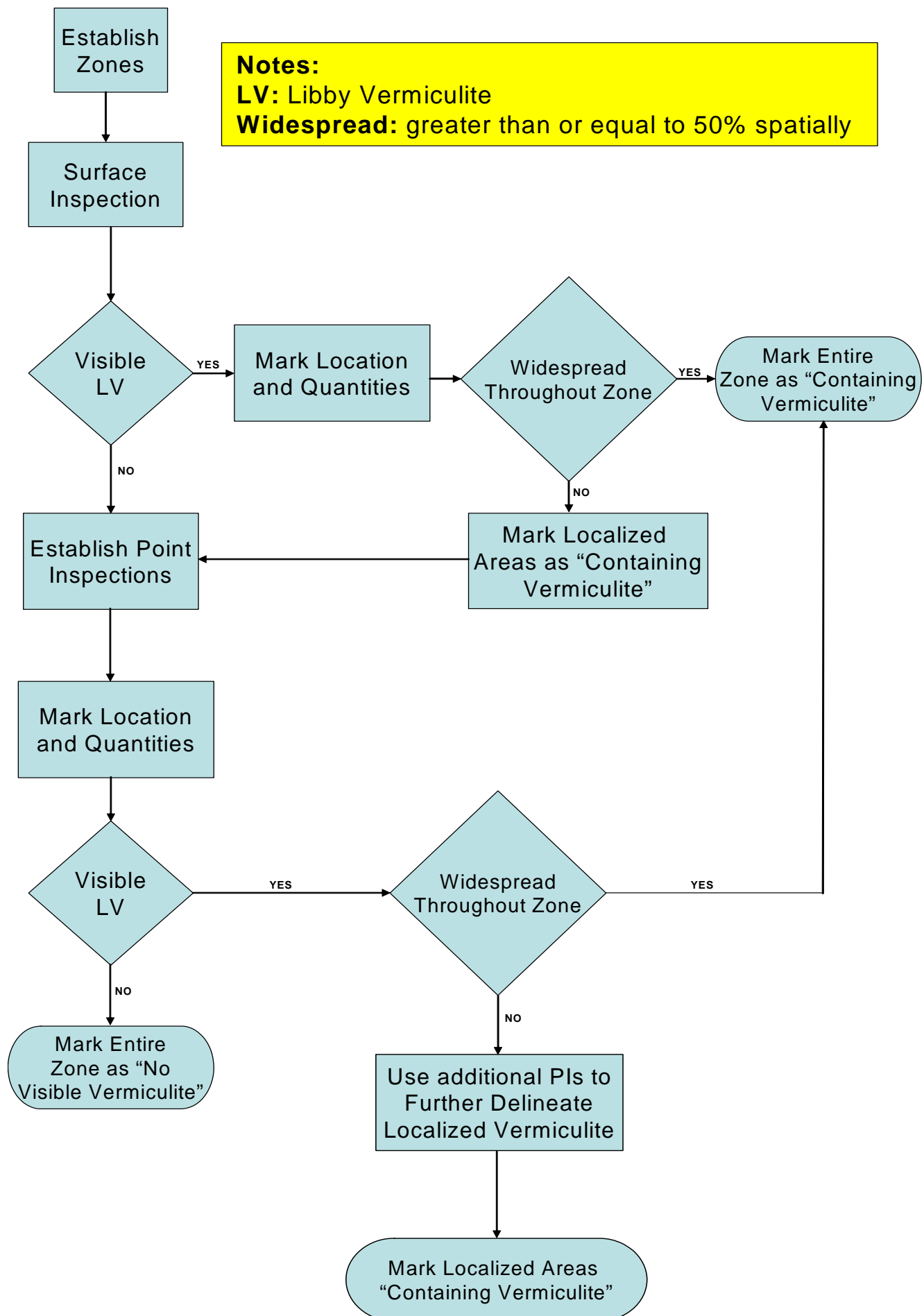
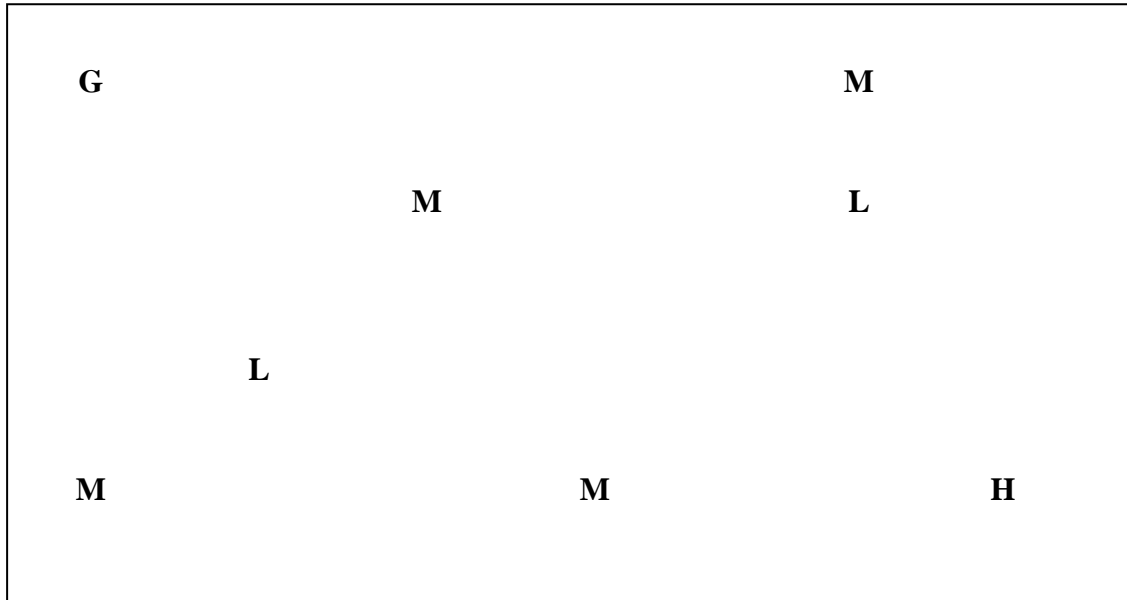
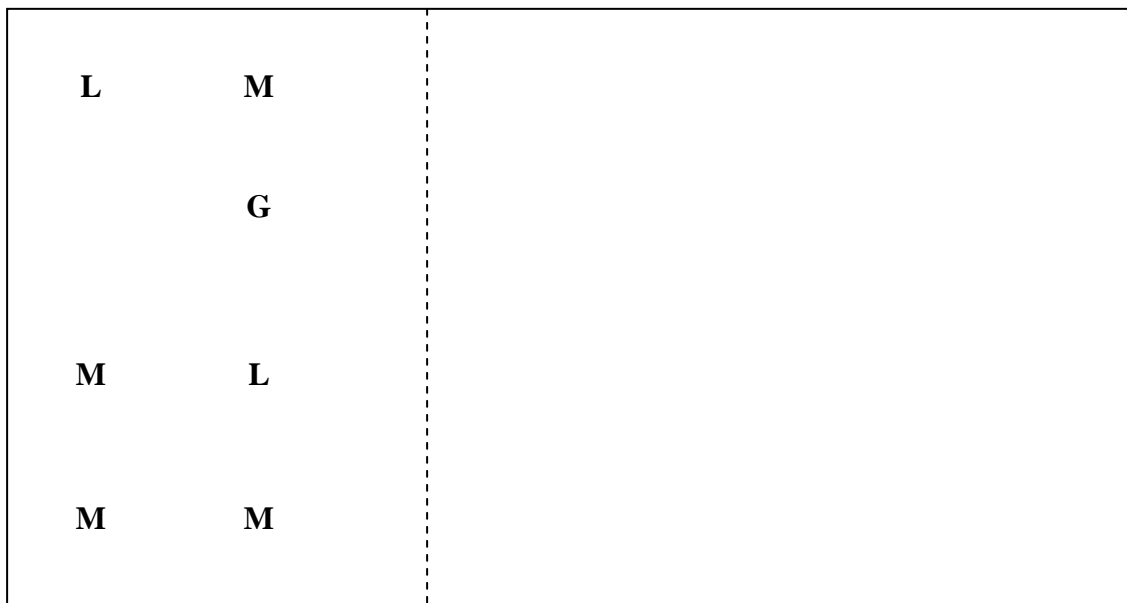


Figure 2 – Vermiculite Distribution Examples

Zone with widespread (i.e., greater than 50 percent) vermiculite distribution



Zone with localized vermiculite distribution



Localized area within zone denoted as containing vermiculite.

Vermiculite Concentration Key

Blank = none L = low M = moderate
H = high G = gross

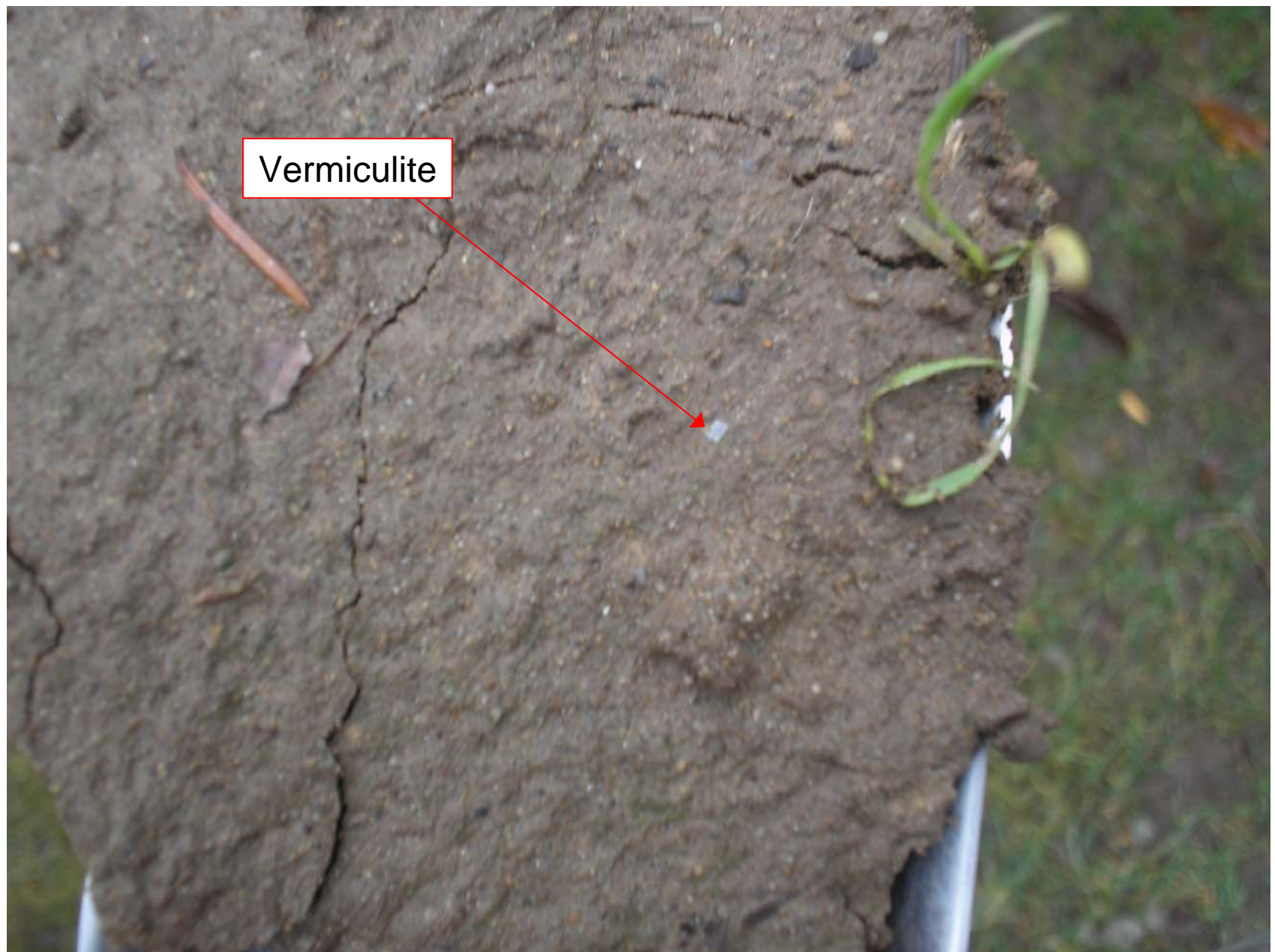


Figure 3a: Low Visible Vermiculite – A maximum of a few flakes of vermiculite observed within a given visual inspection point



Figure 3b: Moderate Visible Vermiculite – Vermiculite easily observed throughout visual inspection point, including the surface.



Figure 3c: High Visible Vermiculite – Vermiculite easily observed throughout visual inspection point, including the surface.



Figure 3d: Gross Visible Vermiculite – Visual inspection point contains Approximately 50% (or greater) vermiculite by volume

Figure 4

LIBBY ASBESTOS PROJECT
Supplimental Exterior Inspection Checklist (SEIC)

Field Logbook No.: _____

Page No.: _____

Site Visit Date: _____

BD Number: _____

Address: _____

Structure Description: Property

Occupant: _____

Phone No.: _____

Owner (If different than occupant): _____

Phone No.: _____

Investigation Team: _____

Field Form Check Completed by (100% of Forms): _____

Visual Verification by Field Team Leader (10% of forms): _____

		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Type (SUA/CUA/LUA/IS)									
Description									
Area Size (square feet)									
SI (X, L, M, H, G)									
SI Wide Spread (yes/no)									
General Comment (Cover, etc.)									
PIs (X=None, L=Low, M=Moderate, H=High, G=Gross)	X								
	L								
	M								
	H								
	G								
Total									

Areas previously identified for removal not inspected for visible vermiculite?

Yes

No

NA

Location(s):
